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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/867,688	05/31/2001	Akira Nishiya	KKH-010	7223

23393 7590 11/29/2002

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EXAMINER

JOLLEY, KIRSTEN

ART UNIT	PAPER NUMBER
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1762

DATE MAILED: 11/29/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/867,688

Applicant(s)

NISHIYA ET AL.

Examiner

Kirsten Crockford Jolley

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 10 October 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) 17-19 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Claims 17-19 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected unit for performing developing treatment, there being no allowable generic or linking claim. Election was made without traverse in Paper No. 5.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 11, 12, 14, and 16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 11 and 12, line 4, the claims are indefinite because it is not clear which end "one end" refers to.

In claims 14 and 16, line 4, the phrase "to the above rotation after said stirring step" is vague and indefinite because it is not clear to what the term "above rotation" refers.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

5. Claims 1, 2, 5, 9, and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Mimasaka et al. (US 5,984,540) or Hirano et al. (US 5,821,035).

With respect to claims 1, 2, 9, and 10, Mimasaka et al. and Hirano et al. both disclose a method of supplying a developing solution to a surface of a substrate comprising: a first step of supplying the developing solution to the surface of the substrate while a developing solution supply nozzle moves from one end of the substrate to the other; a second step of developing the substrate for a predetermined period of time; and rotating the developing solution on the surface of the substrate after a predetermined period of time from the completion of the supply step (col. 4, line 56 to col. 5, line 12, and col. 7, lines 20-43 of Mimasaka et al., and col. 10 and col. 12, lines 3-12 of Hirano et al.). The step of rotating the surface inherently stirs the developing solution on the substrate. As to claim 5, Mimasaka et al. and Hirano et al. both teach that the developing solution is supplied at a prescribed flow rate (col. 4, lines 50-55 of Mimasaka et al.); the prescribed flow rate would inherently be selected to provide a predetermined thickness on the substrate.

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6. Claims 1, 2, 5, 13, and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Fujimoto (US 5,740,488).

With respect to claims 1, 2, 13, and 15, Fujimoto discloses a method of supplying a developing solution to a surface of a substrate comprising: a first step of supplying the developing solution to the surface of the substrate while a developing solution supply nozzle is stopped above the substrate and the substrate is rotated; a second step of developing the substrate for a predetermined period of time; and rotating the developing solution on the surface of the substrate after a predetermined period of time from the completion of the supply step (col. 2, lines 32-65). The step of rotating the surface inherently stirs the developing solution on the substrate. As to claim 5, Fujimoto teaches that the developing solution is supplied in predetermined amounts, times and spray pressures to achieve a high amount of uniformity on the entire substrate surface (col. 1, lines 10-14 and Example 1); these parameters are inherently selected to provide a predetermined thickness on the substrate.

7. Claims 1-5 and 13-16 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 63-132429 A.

With respect to claims 1-3, 13, and 15, JP '429 (see JPO Abstract) discloses a method of supplying a developing solution to a surface of a substrate comprising: a first step of supplying the developing solution to the surface of the substrate while a developing solution supply nozzle is stopped above the substrate and the substrate is rotated in a first direction; a step of reversing the direction of rotation of the substrate so that it is rotated in a second opposite direction; and finally, a third step of reversing the direction of rotation again so that the substrate is rotated

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again in the first direction. For the purposes of the rejection, the first spinning step (where developing solution is first supplied) is considered rotation in a "reverse" direction, followed by a step of spinning in a "normal" direction (when the rotation is initially reversed), followed again by changing rotation to a "reverse" direction. Therefore, the method of JP '429 meets the limitation of claims 1-3 since the substrate is rotated normally and then reversely after a predetermined period of time from completion of the first supplying step. The step of rotating the surface inherently stirs the developing solution on the substrate.

As to claim 4, the method of JP '429 inherently teaches a method of rotating in the "reverse" direction at a speed higher than a speed in the "normal" direction because as the substrate starts and stops rotation in the normal direction, it necessarily is at a speed lower than a speed when the substrate is rotating at the maximum speed in the reverse direction. As to claim 5, JP '429 teaches spinning to achieve a uniform coating, therefore a predetermined thickness is inherently achieved due to the rotation/stirring.

As to claims 14 and 16, it is the Examiner's position that JP '429 teaches a step of supplying developing solution again to the substrate while rotating the substrate in a direction opposite to the rotation in the first supplying step because JP '429's Abstract teaches that "the developer is dripped on a photoresist while the spinner is being turned in the normal or reverse direction." Therefore, it is the Examiner's position that developing solution is supplied to the substrate during each of the rotation steps -- when the rotation is in its first "reverse" rotation direction, in its second "normal" rotation direction, and also in its third "reverse" rotation direction.

8. Claims 1-5 and 13-16 are rejected under 35 U.S.C. 102(e) as being anticipated by Subramanian et al. (US 6,248,175).

With respect to claims 1, 2, 13, and 15, Subramanian et al. discloses a process for supplying developing solution to a substrate surface in the flow diagram illustrated in Figure 8. Steps 240 and 250 meet Applicant's limitation of a first supplying step of supplying developing solution to the substrate surface while the developing solution supply nozzle is stopped above the substrate and the substrate is rotated in a first direction. In step 260, Subramanian et al. discloses a step of reversing the spin direction of the substrate; this step would inherently stir the developing solution on the surface of the substrate. The amount of time between steps 250 and 260 (even if only a fraction of a second) meets Applicant's limitation of a "predetermined period of time" from the completion of the first supplying step, during which the photoresist layer would necessarily be developed.

As to claim 3, it is noted that the Subramanian et al. teaches that the supply of developing solution is stopped before the rotation of the substrate is stopped. Therefore, the amount of time where the substrate is still spinning in the first direction meets Applicant's limitation of normally rotating the substrate, and step 260 meets Applicant's limitation of reversely rotating the substrate. Reverse rotation would inherently be performed at a speed higher than a rotation speed in the normal direction when the substrate is stopping rotation in the normal direction and at a very slow speed, as compared to a maximum rotation speed when rotating in the reverse direction. As to claim 5, Subramanian et al. teaches desiring a uniform developing coating thickness as a result of rotating.

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With respect to claims 14 and 16, Subramanian et al. teaches a step of supplying developing solution to the substrate while the developing solution supply nozzle is stopped above the substrate and the substrate is rotated in a direction opposite to the rotation in the first supplying and stirring step during step 270.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Subramanian et al. (US 6,248,175).

Subramanian et al. teaches a method of measuring the thickness of the developing solution after a step of stirring/rotating the developing solution, however Subramanian et al. does not teach changing the rotation time, rotation speed, or rotation acceleration of the substrate based on the measurement. Instead Subramanian et al. teaches adjusting the volume of developing solution supplied or the location of supply of developing solution (see Figures 7 and 8). It is well known to those skilled in the spin coating art that coating thickness and uniformity are the result of a number of factors including the supply location, spin speed, supply volume, spin time, spin acceleration, atmospheric conditions, etc. It would have been obvious for one having ordinary skill in the art to have adjusted other process conditions contributing to the coating thickness and uniformity, in addition to or instead of the supply location and volume in

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the process of Subramanian et al., such as the spin time, speed and acceleration, because one would have expected achieving improved uniformity and thickness due to other process parameters as well since each of the process parameters affects the final coating.

11. Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirano et al. in view of JP 63-132429 A.

Hirano et al. lacks a teaching of supplying developing solution again the substrate surface while moving the developing solution supply nozzle from the other end after the stirring step. It is the Examiner's position that one having ordinary skill in the art, upon seeing the prior of JP '429, would have been motivated to stop supply of development solution and reverse rotation direction of the substrate, and continue supply of development solution to the substrate in the opposite direction and opposite rotation direction, because JP '429 teaches the benefits of reversing spinning direction in order to obtain an even coating of developing solution on the substrate. It would have been obvious to one having ordinary skill in the art to have stopped supply and then rotation of Hirano et al.'s process, and continued in the reverse direction, as taught by JP '429 in order to obtain a more uniform developing solution coating. The test of obviousness is not express suggestion of the claimed invention in any or all references but rather what the references taken collectively would suggest to those of ordinary skill in the art presumed to be familiar with them. *In re Rosselet*, 347 F.2d 847, 146 USPQ 183 (CCPA 1965); *In re Hedges*, 783 F.2d 1038.

Conclusion

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12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Subramanian et al. (US 6,270,579) is cited for its teachings of supplying developing solution and measuring the thicknesses of the developing solution on the substrate.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kirsten Crockford Jolley whose telephone number is 703-306-5461. The examiner can normally be reached on Monday to Thursday and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on 703-308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1193.

kcj
November 18, 2002

A handwritten signature in black ink, appearing to read "J. Beck", is located in the lower right quadrant of the page.